Aligning strategic objectives with organizational processes: a methodology for virtual enterprise implementation

T.R. Gulledge

R.A. Sommer

George Mason University

The Institute of Public Policy

Fairfax Electronic Commerce Center

10640 Page Avenue, Suite 400

Fairfax, Virginia 22030-4000 USA

gulledge@gmu.edu and rsommer@gmu.edu

Abstract¹

This paper addresses the regulatory, policy and organizational issues that must be *pre-engineered* into business processes before a virtual relationship can exist between potential partners. Our research is centered on two crucial concepts: (1) the development of a strategic *Operational Virtual Enterprise Methodology* that facilitates the rapid formation and reconfiguration (realignment) of organizational processes in response to an external order that necessitates the formation of a virtual organization, and (2) the implementation and validation of the *Operational Virtual Enterprise Methodology* in a manufacturing environment.

Our primary thesis is that an organization can design and implement process interfaces to other internal or external virtual partner organizations to rapidly reconfigure processes for producing a product. This reconfiguration is

¹ This paper was shortened to meet the page limit imposed by the editors. A full version is available from the authors on request.

The original version of this chapter was revised: The copyright line was incorrect. This has been corrected. The Erratum to this chapter is available at DOI: [10.1007/978-0-387-35321-0_72](https://doi.org/10.1007/978-0-387-35321-0_72)

accomplished by integrating the strategic planning functions with the operational planning functions. That is, the method provides management linkages and control functions to lower level process models. This paper summarizes the methodology.

Keywords

Cross-functional Process Integration, Strategic Planning, Process-oriented Information Systems

1 MOTIVATION

One goal of manufacturing companies is to deliver the right products sooner, without pausing for retooling, even for extremely small batch sizes. Quite often the ability to achieve such agility is a function of complex supply chain relationships. Within a typical supply chain there may be several players, each supplying something (goods, materials, services, technology, etc.) to the next. While in theory each partner depends upon the other and stands to gain from the other's success, in practice the relationship is often less balanced. The reasons for the imbalance are complex, but often the level of trust that exists between former competitors directly influences the virtual relationship. There is a constant struggle to gain advantage and control. For example, large customers often play off potential suppliers against each other on prices

Economic theory provides a simple explanation of this phenomenon through the theory of transactions costs (Williamson, 1975). Williamson suggests that firms will eventually find the costs of managing external supply chains so high that they will bring the activities in-house and pursue a policy of vertical integration. Vertically integrated firms were able to flourish and exploit scale economies for many years because of relatively stable market environments. However, in recent years the situation has changed. An increasingly turbulent and fragmented market environment has forced many firms to become more focused on distinctive competencies. In addition, new enabling information technologies have provided the potential to greatly reduce inter and intra-firm transactions costs within the supply chain. This has led to an interest in creating "networks of firms" that are strategically organized around common process interfaces. This network of enterprises is called a *virtual organization*. Our implementation of the virtual enterprise (Figure 1) includes specific function interfaces that are based on a logical pre-engineered *reference model* [see Hars (1994) and Scheer and Hars (1992)] adopted by all partners.

We adopt the Goldman, et al. (1995) definition of a virtual organization: "A virtual organizational structure is an opportunistic alliance of core competencies distributed among a number of distinct operating entities within a single large company or among a group of independent companies."

Figure 1 Pre-Engineered and Shared Process Functions

2 AN OPERATIONAL VIRTUAL ENTERPRISE METHODOLOGY

This paper presents a new and strategically focused *Operational Virtual Enterprise Methodology* that is implemented as an *Integrated Process Engineering (IPE)*² reference model, and represents a new approach for modeling complex organizations. It identifies different "views" of an organization and integrates them into a cohesive structure that guides critical organizational planning from the highest to the lowest levels. It encompasses *strategic planning and strategic modeling*, *process planning and modeling*, and eventually *system development and implementation* (Figure 2).

² Integrated Process Engineering is presented in Anderson, et al. (1994). A copy is available from the authors on request.

Figure 2 Integrated Process Engineering Reference Model

2.1 Research Hypothesis

The method extends an approach developed by Scheer (1992, 1994) for modeling complex organizations. It builds from Scheer's organizational "views" and integrates them into a structure that guides organizational planning from the highest level. It encompasses strategic planning, mid-level planning, implementation planning, and eventually system development and implementation. Our overall research hypothesis is that detailed planning through IPE is a prerequisite for forming a virtual organization. This concept is presented at a summary level in this section.

3 STEPS FOR IPE VIRTUAL ENTERPRISE PLANNING

3.1 The Narrative Strategic Plan - STEP 1

Through facilitated seminars, managers develop a narrative strategic plan that identifies areas of competitive advantage and high-level process change requirements. This is based on the strategic planning pyramid of Figure 3.

An important assumption of this research is that the development of the strategic planning model is a prime factor in allowing the organization to identify its competitive advantage (i.e., becoming self-aware) and plan to reengineer (change) accordingly.

Figure 3 Strategic planning pyramid

3.2 The Link to the Formal Strategic Planning Model - STEP 2

The purpose of this step is to link each goal and strategy in the narrative plan to a planning model that is based on formal entity/relationship concepts (Figure 4). The model explains how *policies* and *regulations* influence and guide the specific strategic planning elements in the narrative plan.

3.3 The Association to Organizational Processes - STEP 3

The third step is to associate and link the strategic planning model to organizational processes by creating an extended strategic planning model. This concept extends the model by associating existing entities/relationships with decomposed **functions**, **activities**, work-flow-based **tasks**, and **action** process elements.

Figure 4 Model for linking a narrative plan to a formal strategic planning model

3.4 The Transformation - STEP 4

Transform the organizational planning model into an integrated function view that can be further refined into a more comprehensive reference model that includes organizational, data and dynamic process views. (Figure 5).

4 EMPIRICAL APPLICATIONS

This model has been empirically tested for the intra-firm case in two manufacturing firms. The results for these two firms, documented using the case

study method, were extremely positive. In both cases, specific performance criteria were enhanced. The results of these studies are documented in Sommer (1998)³.

5 CONCLUSIONS

In our research, we see little evidence that firm's are *rapidly* creating virtual production enterprises. There is much emphasis on the management of intra-firm and supplier relationships, which is the implementation focus of this methodology.

Since inter- or intra-firm relationships are difficult to manage, a formal method that links all managerial and technical views is needed. The major benefit of the *Operational Virtual Enterprise Methodology* and *reference model* concept is that it provides such critical links. It is necessary to have such a methodology for linking strategic plans to processes in individual organizations, but it is absolutely essential for planning across the virtual organization.

Figure 5 Logical Association of Formal Model to Organizational Processes

³ Space limitations preclude the presentation of these results.

5 BIBLIOGRAPHY

- Anderson, R.A., T.R. Gullledge, and R.A. Sommer (1994) *Integrated Process Engineering*, Unpublished Manuscript, Policy Analysis Center, George Mason University, Fairfax, VA.
- Goldman, S.L., R.N. Nagel, and K. Preiss. *Agile Competitors and Virtual Competitors: Strategies for Enriching the Customer*. New York: Van Nostrand Reinhold, 1995.
- Hars, A. (1994) *Referenzdatenmodelle: Grundlagen Effizienter Datenmodellierung*, Gäbler Verlag GMBH, Wiesbaden, Germany.
- Scheer, A.-W. and A. Hars (1992) *Extending Data Modeling to Cover the Whole Enterprise*, Communications of the ACM, Vol. 35. No. 9, 166-172.
- Scheer, A.-W., (1992) *Architecture of Integrated Information Systems: Foundations of Enterprise Modeling*, Berlin: Springer-Verlag.
- Scheer, A.-W., (1994) *Business Process Engineering: Reference Models for Industrial Enterprises*, Berlin: Springer-Verlag.
- Sommer, R.A., (1998) *Function-Oriented Process Planning Methodologies*, Unpublished Ph.D. Dissertation, George Mason University (USA).
- Williamson, O. *Markets and Hierarchies*. New York: Free Press, 1975.

7 BIOGRAPHIES

Thomas Gullledge is Professor of Public Policy and Engineering at George Mason University and Director of the Policy Analysis Center within the Institute of Public Policy. He provides lectures in *Organizational Informatics, Planning, Engineering Management, and Enterprise Integration*. Professor Gullledge is the University Principal Investigator for the U.S. Defense Logistics Agency Funded Electronic Commerce Resource Center (ECRC) and the National Science Foundation Funded Software Technical Assistance Contract. He is also the Program Manager for ongoing funded initiatives relating to Defense Enterprise Planning and Management.

Rainer Sommer is Associate Research Professor of Systems Engineering in the Policy Analysis Center of George Mason University's Institute of Public Policy. He provides lectures *Systems Analysis and Design, Data and Telecommunication Networks and Distributed Processing, Data Structures and Software Design and Reengineering in the Public Sector*. At the Policy Analysis Center he is working on issues related to Enterprise Integration, Integrated Process Engineering, Technology Assessment, and Technology Transfer.